Smith Ranch Storage Ponds
Investigation Report
Permit to Mine 633

Prepared For

Cameco Resources
Smith Ranch-Highland Operation
PO Box 1210
Glenrock, WY 82637

Prepared By

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March 12, 2013

Wright
Environmental Services, Inc.

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FIGURE

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1.0 INTRODUCTION

In a letter dated February 22, 2012, Wyoming Department of Environmental Quality (WDEQ), Land Quality Division (LQD) notified Power Resources Inc. doing business as Cameco Resources (Cameco) that an investigation into potential seepage from the Smith Ranch Permit to Mine 633 storage ponds was needed. LQD expressed a concern that "seepage from the storage ponds may be creating a plume of contaminated groundwater."

Wright Environmental Services, Inc. (Wright) submitted a work plan to Cameco (WES, 2012) that presented the methods to be employed in investigating potential seepage from the Smith Ranch storage ponds (ponds) into the shallow subsurface. This plan proposed assessing available existing site data (i.e., geologic, pond construction and operational data) as well as water quality conditions in the shallow subsurface beneath the Smith Ranch storage ponds. The objective of the investigative fieldwork was to determine if there have been impacts to the shallow groundwater quality beneath the storage pond. Cameco submitted this plan to WDEQ/LQD on May 25, 2012 and the LQD responded on October 17, 2012.

This report details the field investigation and documents the finding that groundwater is not present in the shallow subsurface downgradient of the ponds and no contaminated groundwater was encountered.

2.0 PROJECT HISTORY

2.1 Storage Pond History

Two lined storage ponds were constructed in 1981 and authorized under NRC License SUA-1387. The ponds are currently authorized under Nuclear Regulatory Commission (NRC) License SUA-1548. These ponds are located in Section 36 of Township 36 North, Range 74 West north of the Central Processing Plant (CPP) at the Smith Ranch facility. The ponds were intended as interim storage for operational liquid wastes containing high total dissolved solids prior to disposal in Smith Ranch-Highland Uranium Project's (SR-HUP) deep disposal well system.

2.1.1 Storage Pond Construction

As outlined in the Smith Ranch Technical Report (Cameco, 2012a) submitted as part of the NRC License SUA-1548 Renewal, the two storage ponds are double lined, constructed with a synthetic primary liner underlain by a compacted sandy clay base liner. The bottom of each pond has a two-way slope toward the center. A sand layer was placed over the compacted sandy clay pond base. A leak detection system consisting of a network of perforated pipes was installed in the sand layer with the pipes draining to a collection sump. The sand layer is overlain by a 30mil (.75mm Min.) thick 8130 XR-5® geomembrane liner. Should a leak in the primary liner occur, the water will flow through the sand above the compacted sandy clay base liner, enter a perforated pipe, and flow to the collection sump. As outlined in the SR-HUP Application - Reynolds Ranch Amendment (Power Resources, 2006) to NRC License SUA-1548, each storage pond has a capacity of 0.78 acre feet of water. Each pond is 100 feet by 100 feet at the crest and is eight feet in depth. During operation, a minimum of three feet of freeboard is maintained in each pond to protect the berms from wind generated wave action, though these ponds have historically not been full.

2.1.2 Storage Pond Operations

The storage ponds have been used to manage process fluids with high dissolved solids concentrations, liquids from well swabbing of operational wells, soils and fluids accumulating during spill remediation activities, and other fluids with high solids content that are generated during operational activities at the facility prior to disposal of these fluids in the deep disposal injection wells. Tears or breaks in the 8130 XR-5® liner have been identified and repaired over the life of the storage ponds (Cameco, 2012a).

2.1.3 Storage Pond Monitoring

The monitoring program for the lined ponds (PRI, 2003) includes either a fluid level sensor in each pond sump with an alarm displayed at the CPP or a daily inspection of each sump by an operator. The storage ponds are inspected daily for visual indications of leaks or embankment deterioration by an individual instructed in proper inspection procedures. The pond inspections are recorded and initialed by the inspector. Upon detecting a leak, site personnel have responded immediately by taking actions to stop and contain the leak. Typical actions include lowering of pond water levels (increasing the freeboard) to prevent additional inflow to the secondary containment/leak detection system, recovery of pond leakage from the secondary containment system, isolation of the area of the leak and repair of the liner breach. Once all repairs have been made, water levels are raised to test the integrity of the primary liner prior to resuming operation of the storage pond.

A total of 14 leak events have occurred at the East and West Storage Ponds since the previous license submittal in 2000 (Cameco, 2012a). Based on the leak event investigations and associated corrective actions, leak events since 2000 have been limited to minor breaches (e.g., small holes and/or tears) to the primary liner of the pond containment system. As part of the corrective action process associated with these events, several design and/or operational changes have occurred to reduce the frequency of pond leakage. These changes include:

- Installation of pumps in each pond to supplement the need for transfer hoses and prevent leaks caused by the camlock end of transfer hoses (1999);

- Use of higher grade patch kits during liner repair, consisting of HH - 66 vinyl cement and vinyl laminated fabric or equivalent materials (starting 2000);

- New liner installations on the West Pond (2005) and East Pond (2008); and

- Fencing upgrades (2009) to restrict wildlife (deer) access.

The East Pond, which had the primary liner replaced in 2008, has continued to experience leaks in consecutive years since 2008. While these leaks from the East Pond have been limited to minor breaches (holes and/or tears) in the primary liner, Cameco continues to evaluate the performance of the liner system and potential design and/or operational changes to reduce the frequency of leak events in the future.

A summary of recent water quality results were provided in the work plan (WES, 2012). The water quality of samples collected from the standpipe resembles that of the liquids in the pond, which contain elevated levels of chloride, sulfate, and uranium. Thus, it is believed that water from the pond is seeping through holes within the primary liner, which were identified and summarized within the March 29, 2012 letter (Cameco, 2012b).

3.0 INVESTIGATION

The objective of the investigation was to determine if seepage from the ponds is migrating vertically past the leak detection system, infiltrating near-surface soils and shallow bedrock. A preliminary review of geophysical logs from wells near the facility indicated sandy soils overlying shale that occurred at of 25 to 55 feet below ground surface and varied in thickness from 25 feet to 50 feet (WES, 2012). The shallow soils overlying the shale would most likely intercept any potential leakage from the ponds. The preliminary interpretation of the uppermost-sand unit below the shale is that it pinches-out to the west and is of limited areal extent.

Five test pits and three boreholes were proposed to investigate the shallow subsurface geology. The locations of these test pits and boreholes are provided in Figure 1.

3.1 Test Pits

As described in the field report provided in Appendix A with locations shown on Figure 1, a backhoe was used to excavate five test pits in the anticipated down gradient direction of the ponds. Test pits were excavated to depths of ten to fifteen feet. Test pit sidewalls were logged by a geologist, photographed, and the test pits left open for 24 hours. No water was found in any test pit during the excavation or during the 24-hour period following excavation. After 24 hours, the excavation was photographed and the absence of water documented.

3.2 Drilling

Drilling was conducted following the test pit excavation. A total of three boreholes were drilled at the locations identified in Figure 1. These boreholes were drilled by Tyler Exploration using air-rotary methods that allowed logging of lithology and determination of the presence or absence of saturated conditions. These boreholes are located near the test pits in the anticipated down gradient direction from the ponds (west, south, and east), and terminated at depths between 51 and 80 feet. The field report for drilling activities is provided in Appendix B. A geologist logged the

lithology in each borehole, identified the presence or absence of saturated conditions, and documented the total depth of the borehole.

As described in Appendix B, drilling equipment was pressure washed between boreholes to minimize the potential for cross contamination. Since saturated conditions did not exist within the boreholes, all boreholes were abandoned using best management practices and in accordance with LQD Non-Coal Rules and Regulations Chapter 8 and Wyoming Statutes §35-11-404 (Appendix B).

4.0 DISCUSSION

No groundwater was identified in either the test pits or the boreholes completed in the anticipated down gradient direction from the ponds. As shown on Figure 1, these test pits and boreholes are located topographically lower than the ponds. If seepage from the ponds were impacting groundwater, groundwater would have been identified in the shallow units overlying the thicker shale unit that runs beneath the pond. No groundwater was identified in these units.

5.0 CONCLUSIONS

No groundwater was identified in either the test pits or the boreholes completed in the anticipated down gradient direction from the ponds. Therefore, the results of this investigation indicate that the leak detection and secondary liner systems are functioning effectively to identify failures in the primary liner and are effective at containing liquids from the storage ponds. There is no evidence of sufficient seepage to create saturated conditions above the uppermost shale and there are no existing saturated conditions that could be impacted.

6.0 REFERENCES

Wright Environmental Services, Inc. (WES). 2012. Smith Ranch Storage Ponds, Investigation Work Plan, May 18, 2012.

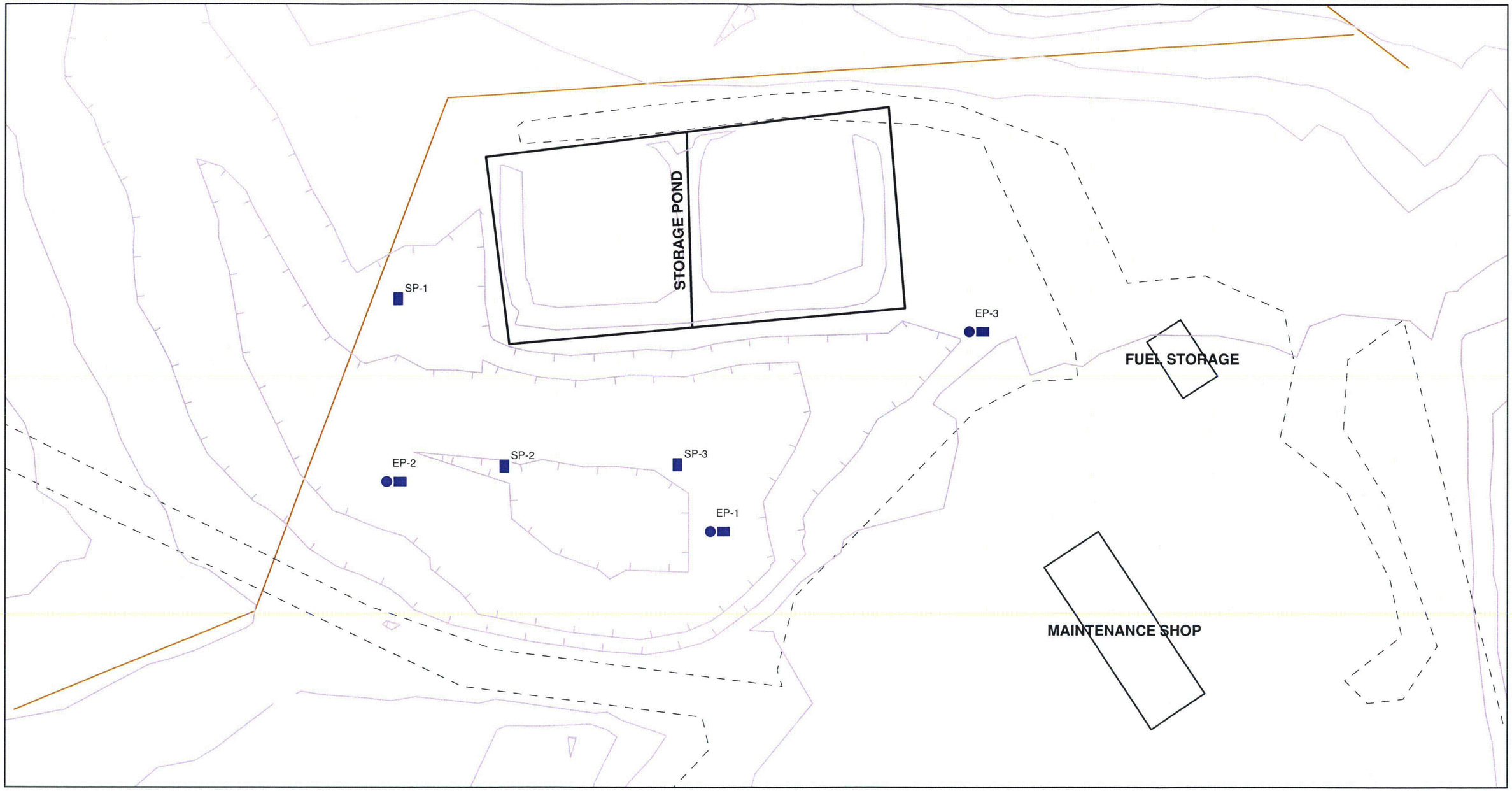
Cameco Resources. (Cameco). 2012a. Nuclear Regulatory Commission Source Material License No. SUA-1548 License Renewal Application Technical Report, February 2012.

Cameco Resources. (Cameco). 2012b. Letter from Ken Garoutte to Lowell Spackman, East Evaporation Pond Leak, Cameco Resources, Smith Ranch-Highland Uranium Project, Permit to Mine 633, March 29, 2012.

Power Resources, Inc. (PRI). 2003. Smith Ranch – Highland Uranium Project, Source Material License Application, Volume I, Chapters 1 -10, May 6, 2003 (Revised December 2004, March 2006 and January 2008).

Power Resources, Inc. (PRI). 2006. Reynolds Ranch Amendment, License No. 1548 Smith Ranch- Highland Uranium Project

FIGURE



Borehole and Test Pit

Test Pit

0 75 150 Feet

N

Figure 1
Test Pit and Borehole Locations

PROJECT: 386200	TASK: 11
PREPARED BY: Wright Environmental Services, Inc.	PREPARED FOR: Cameco Resources

APPENDIX A

TELESTO
SOLUTIONS • INCORPORATED

2950 E. Harmony Rd., Suite 200
Fort Collins, Colorado 80528
970-484-7704 / 970-484-7789 (FAX)

Field Report: East Storage Pond Test Pits

DATE: 11/15/2012 **Telesto #**

CLIENT: Power Resources, Cameco: Smith Ranch - Highland

BY: Parker Scherman

SUBJECT: Smith Ranch Storage Ponds Test Pit Excavation and Sampling

Problem Statement

In the May 18, 2012 Smith Ranch Storage Ponds Investigation Work Plan (Work Plan), Cameco Resources, Inc. (Cameco) proposed to excavate three test pits adjacent to the Storage Ponds at Smith Ranch-Highland. The purpose of the test pits is to investigate the geologic and hydrologic conditions below the East and West Storage Ponds.

Objectives

The objectives of this investigation were to characterize the shallow subsurface lithology adjacent to the Storage Ponds, determine the presence or absence of saturated conditions in the shallow subsurface, and ascertain if there is evidence of groundwater quality impacts from potential pond seepage.

Approach

Field activities outlined in the Work Plan included:

1) Excavate five (5) test pits with a backhoe to depths of approximately 15 feet.
2) Record and describe soil/unconsolidated sediment excavation of each pit.
3) Let test pit stand open for 24 hours.
4) Sample any water that collects in each pit after 24 hours.
5) Observe any changes to each pit that occurred in the 24-hour period.

Field Investigation

Five test pits were excavated by Cameco as outlined in the Work Plan with a track hoe on November 15, 2012. The test pits were located south of the Storage Ponds. The test pits were excavated to depths between 10 feet and 16.5 feet below ground surface, which was the maximum depth of the backhoe arm and below the bottom elevation of the ponds. Soil and unconsolidated sediment was continuously logged. General information about each test pit is provided in Table 1. Material removed from each test pit was set next to the test pit. Copies of field notes and photographs of each test pit are included as Exhibits A and B to this Test Pit Field Report, respectively.

Test pit EP-1 encountered a buried historical debris pile and excavation was discontinued at a depth of 10 feet.

No water was observed in the test pits during excavation. The test pits were left open for 24 hours to allow any available water to accumulate in the pits. On November 16, 2012, the test pits were again checked for water and all test pits were observed to be dry. Some collapsing of the sidewalls of the pits was noted.

Discussion and Conclusions

The test pit investigation concluded on November 16th, 2012. After the 24 hours, no changes were observed in the test pits except for minor collapsing of the sidewalls. These observations indicate the shallow soils beneath Ponds are unsaturated over the area and depth assessed for this investigation.

Table 1

Test Pit	Water	Dimensions (L'xW'xD')	Soil Description	Unconsolidated Sediment Description	Comments
SP-1	NO	3'x15'x15'	Sandy light tan soil with medium to coarse grain size, grass roots penetrating few inches. Total soil depth of approx. 2ft.	Very sandy with medium to coarse grain size, light tan colored. At 8ft. sand becomes more compact with some clay. From 10 to 12 ft. fine grained dark gray clay with some moisture. From 12 to 15ft sandy clay with medium sand grain size, gray colored, with low moisture.	The pit wall collapse easily because of sand.
SP-2	NO	3'x14'x16.5'	Medium grained light tan sand with organics, dry. Total soil depth approx. 1-2ft.	First 5ft. Very coarse sand, well sorted with low moisture content. At 6ft. Clay with sand, light brown, low moisture. From 6 to 16ft Sandy clay, medium to light brown, low moisture, fine to medium grained.	Last bucket from pit looked to have a higher percentage of clay.
SP-3	NO	3'x15'x16'	Sandy medium grained with organics. Total Depth approx. 1ft.	Dark brown sandy clay with low moisture to 10ft, with medium grained size. 10 ft. to 15ft the sediment turns to higher clay content, well compacted, increased moisture.	Mostly clay rich, pit walls hold well.
EP-1	NO	Top: 14'x15'x10' narrows to 3'x6'	Gravely sand light brown, dry. Gravel looks artificial.	Top 7.5 ft. coarse sand with low moisture, trash and waste found such as; nails, wire, wood chunks, concrete and asphalt chunks. At 7.5 fine to medium sand with some clay, light tan, sand shows oxidation from Iron nails and other trash.	Abundance of trash encountered. Orange line encountered at 10ft. Stopped the pits excavation at 10ft.
EP-2	NO	3'x16'x15'	Well compacted medium grained sand, reddish brown with some mottling, dry.	Medium grained brown to dark brown sandy clay to 9 feet, At 9 ft. moist dark brown clay about 1ft. Thick. From 10 ft. to 15ft. Clay with fine to medium sand, dark brown and moist.	Mostly clay rich, moisture content was high (would steam on surface), dried out overnight.

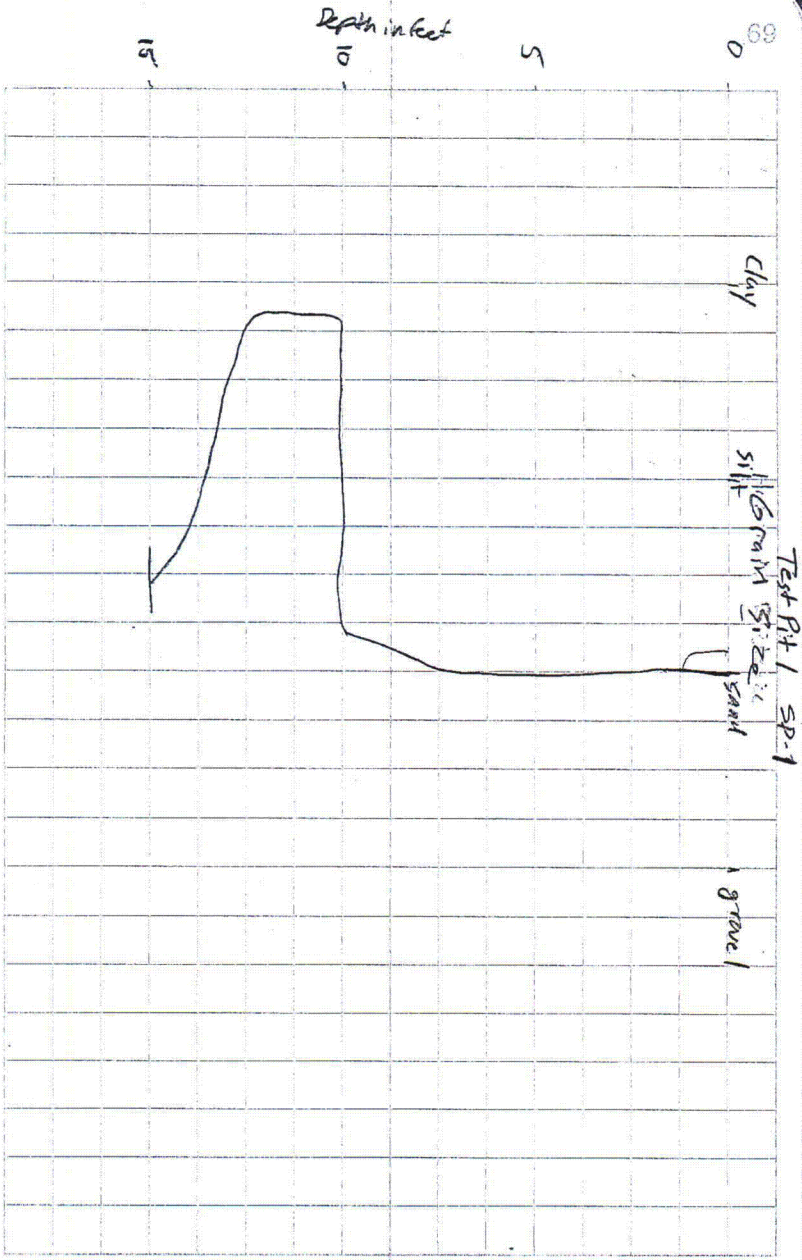
EXHIBIT A

East Storage Pond Test Pits

11/15 Operator: Brian

Parker S. on-site @ 6:40am

- Talked to Perry and 5 pits will be dug starting @ 8:00am.
- Walk through sites @ 8:11
  6th pit not to be dug until it is asked
- Plan:
  - sample soil every 5ft
  - Log hole
  - leave 24hrs for possible H2O



S= chip tray sample

8:40 SP-1 start dig

- S Top soil 0-5 ft soil to ~2ft
  Sandy moist (low), coarse sub angular grains, light tan colored, medium to coarse

5-10 ft

- Very sandy
  @ 5ft more compact sand (med grained w/ clays)
- S @ 10ft clay fine grained, dark gray, some med. grained sand

10-15 ft

clay to 12ft, dark gray (moist)

- S sandier- moving to sandy clay @ 12ft, dark gray (moist)
- S 13ft sandy clay med grained (clay % lowering)
- S 14ft clay w/ sand, dark gray, moist
  Clay sand at 15ft, dark gray, moist
- Stop digging @ 15ft
- Sand is collapsing

15 10 5 0

Clay

Silt

Sand

Gravel

11/15 S=chip tray sample

9:14 SP-3 test pit start

S Topsoil: Sandy w/ organics

0-5ft:

~1 ft sand

S @ 3ft Dark Brown sandy clay (dry)

S @ 5ft Dark Brown sandy clay (low moist)

S 8ft Sand w/ low clay darker color (low moist)

10ft Sandy clay (moist) *highest H2O content of pit

S 12ft Sandy clay (red) lighter brown (moist)

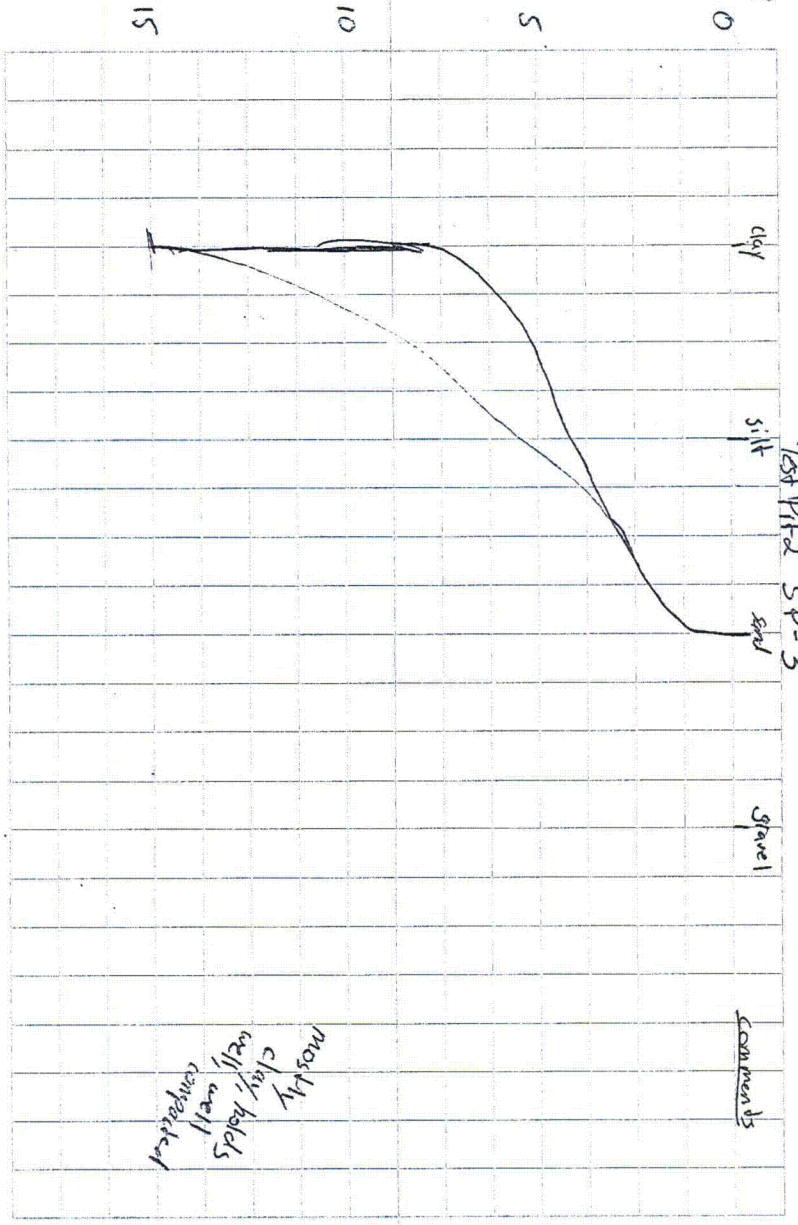
S 14ft clay w/ low sand (moist)

S 15ft clay w/ low sand (moist)

Stop @ 16ft clay w/ low sand (moist)

9:45 am

Pit held well b/c of clay



S = Chip tray sample

11/15

9:50 SP-2 test pit start

S Topsoil: medium light sand w/ organics (dry)

S 5 ft: Very coarse well sorted sand (low moisture)

S 6 ft Sandy clay light brown (low moisture), high clay %

S 10 ft Sandy clay (fine sand) (low moisture) med brown

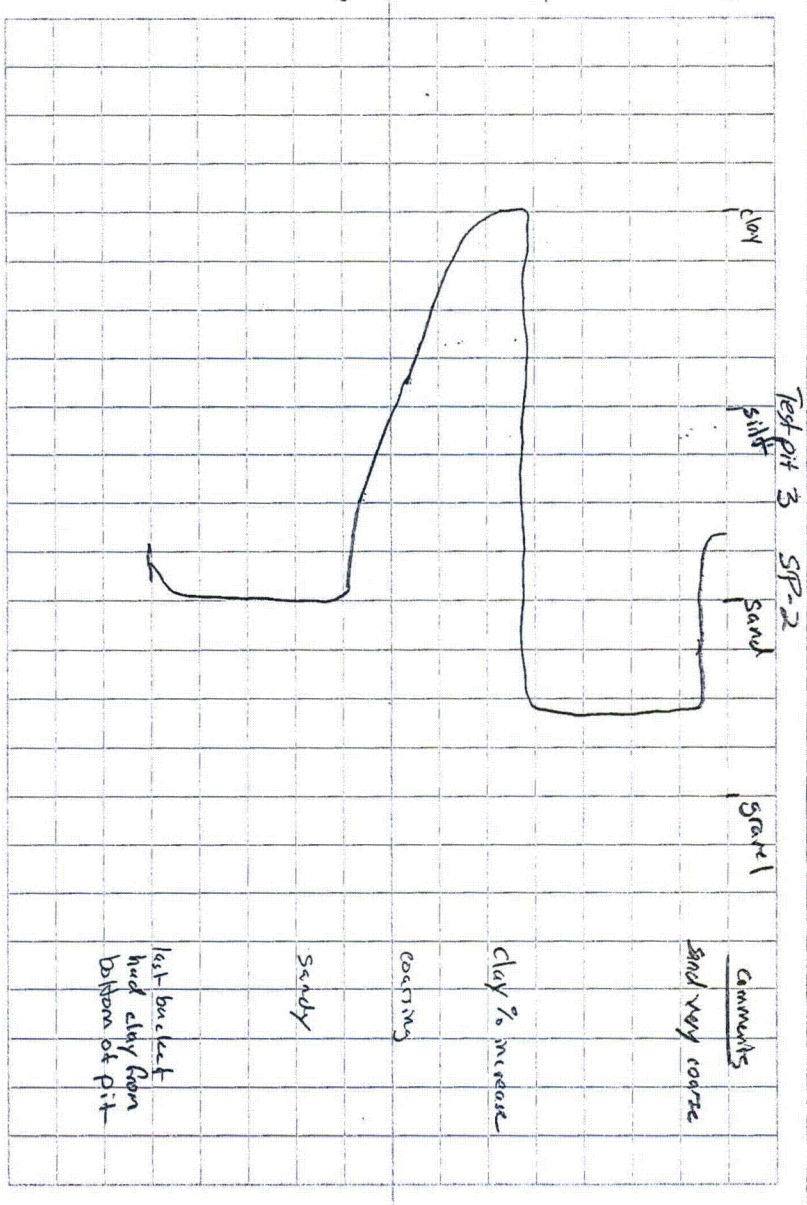
S 15 ft Sandy low clay, moisture low, light brown

16 ft Sandy clay boundary

16.5 ft clay w/ low sand

Stop dig @ 16.5 ft

@ 10:09 am



S= chip tray sample

11/15 10:11am ~35°F

EP-2 Test pit * Dug 16 ft from marker

S Topsoil: Reddish brown hard, well compacted sand (med) Dry, some red/brown mottling

S 5ft: Clay sand dark brown (dry)

6ft: Sandy ~~clay~~ w/ low clay (low moisture)

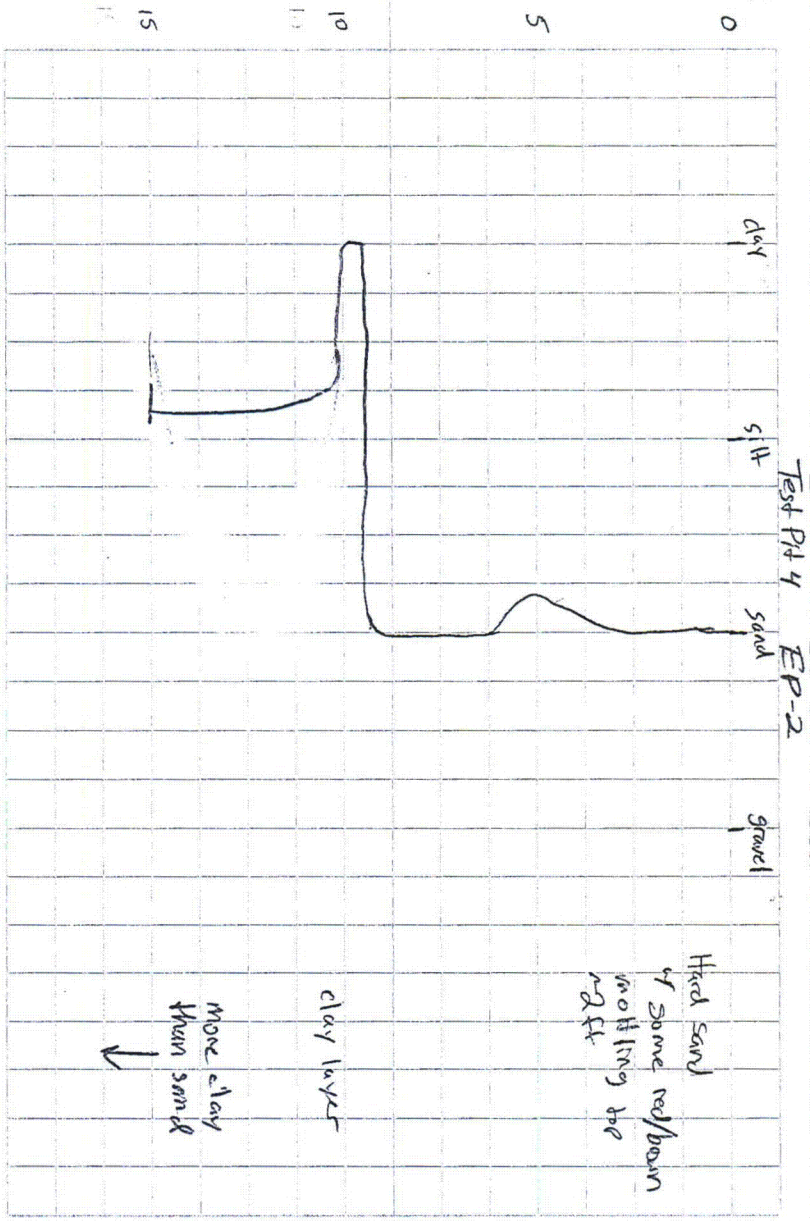
S 9ft: clay moist dark brown (moist)

10ft: clay sand (moist)

S 13ft: Clay dark brown (moist enough to steam on surface)

S 15ft: Dark clay w/ some sand

Stope 15ft 10:28am



11/15

S = chip tray sample

EP-1 start @ 10:46

S Topsoil: Gravelly sand (anthropogenic looking) light brown, dry

S 5ft Coarse sand w/ concrete chunks, rags, wood chunks nails
concrete is @ ~2ft

S 7.5ft Fine sand w/ clay reddish brown, mostly brown low moisture

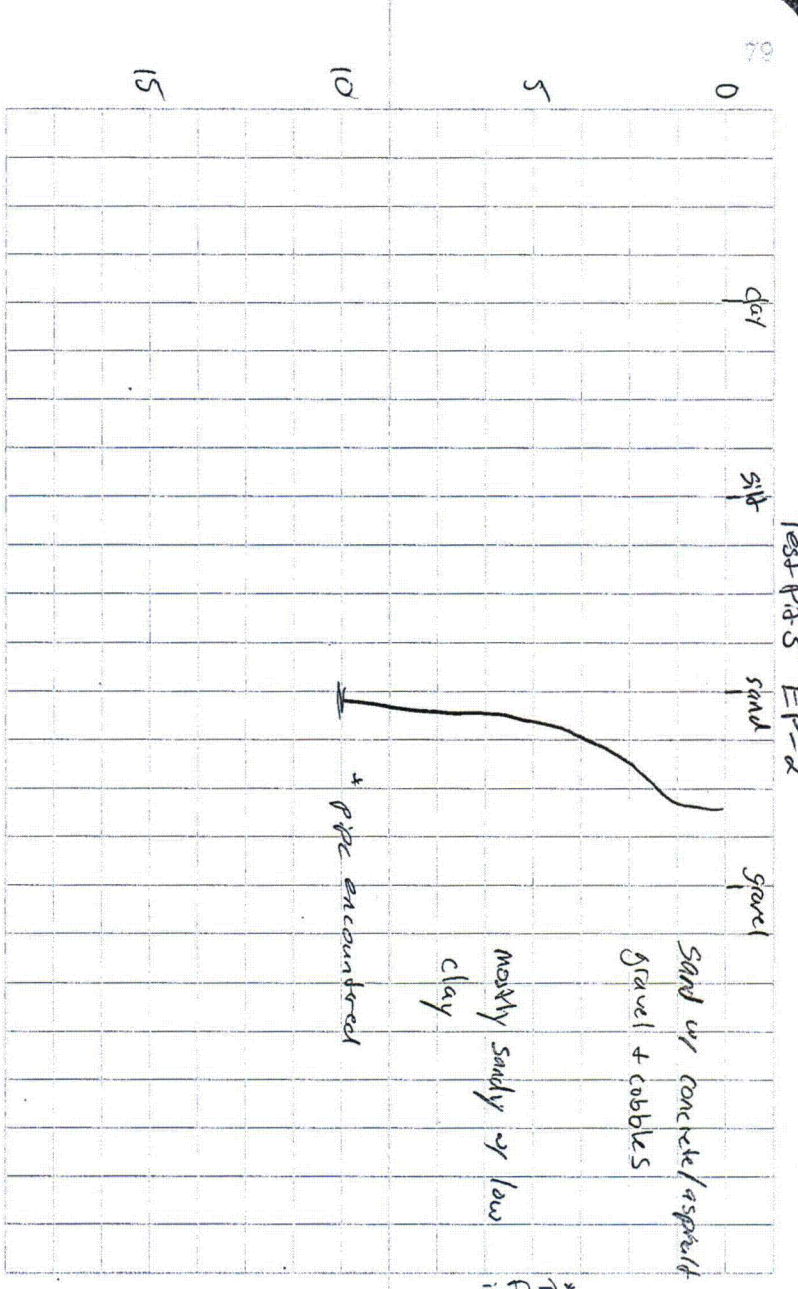
I 10ft clay w/ sand, low moisture, other colored sed. Fe / rust colored, iron trash related probably

* concrete, rags, some sort of orange line encountered @ 10ft.

- Dig a wide pit safe for ferry to investigate encountered line @ 11:14am

Stop @ 12:22 @ 10ft b/c of line

Test Pit S EP-2



11/16 * all GPS pts taken from center of pit

Parker Scherman on-site @ 7:45am

Test Pit Observation after 24hr

Clear, Sunny, slight breeze, ~40°F

SP-1

- NO Water or moisture
- Some collapsing with in pit
- Dimentions 3'x15'
- ~ 1ft below surface on north side red brown mottling.
- GPS taken Name= SP-1
- Pictures taken

EP-2 * Pit located 16 ft N/down hill ~~toward~~ towards pond

- NO water or moisture, pit walls have dried out
- low ammount of collapse in pit
- Dimentions 3'x16'
- GPS taken Name = EP-2
- Pictures taken

SP-2

- NO Water or moisture
- Some collapsing within pit
- Dimentions 3'x14'
- GPS taken Name = SP-2
- Pictures taken

* Pic note: 671
cracks in ground surface

11/16

SP-3

- NO water or moisture
- large cracks formed in clay walls and collapsing in
- Dimentions 3'x15'
- GPS taken Name= SP-3
- Pictures taken

EP-1

- NO water or moisture in pit
- Not a lot of collapse, b/c wide
- Dimentions 14'x15' narrowing to 3'x~6'
- GPS taken near center Name = EP-1
- Pictures taken

EXHIBIT B

NOVEMBER 15, 2012
EP-1

NOVEMBER 16, 2012
EP-1

NOVEMBER 15, 2012
EP-2

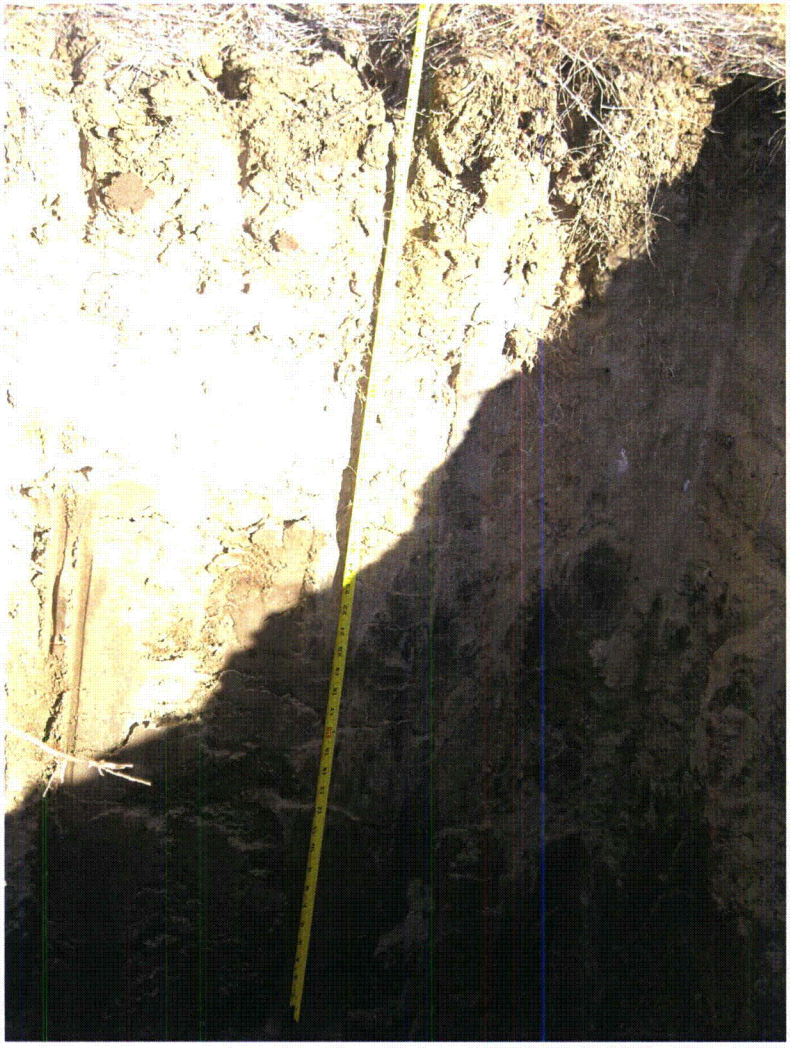
NOVEMBER 16, 2012
EP-2

NOVEMBER 15, 2012
SP-1

NOVEMBER 16, 2012
SP-1

NOVEMBER 16, 2012
SP-2

NOVEMBER 15, 2012
SP-3



NOVEMBER 16, 2012
SP-3

APPENDIX B

TELESTO
SOLUTIONS • INCORPORATED

2950 E. Harmony Rd., Suite 200
Fort Collins, Colorado 80528
970-484-7704 / 970-484-7789 (FAX)

Field Report: East Storage Pond Boreholes

DATE:	**2/16/2013**	**Telesto #**	**386500**
TO:	**Power Resources, Cameco: Smith Ranch - Highland**		
FROM:	**Parker Coit**		
SUBJECT:	**Smith Ranch Storage Ponds Borehole Drilling**		

Problem Statement
In the May 18, 2012 Smith Ranch Storage Ponds Investigation Work Plan (Work Plan), Cameco Resources, Inc. (Cameco) proposed to drill three boreholes adjacent to the East Storage Pond at Smith Ranch-Highland. The purpose of the boreholes is to investigate the geologic and hydrologic conditions below the East and West Storage Ponds.

Objectives
The objectives of this investigation were to characterize the shallow subsurface lithology in the estimated downgradient direction from the Storage Ponds, determine the presence or absence of saturated conditions in the shallow subsurface, and ascertain if there is evidence of groundwater quality impacts from potential pond seepage.

Approach
As outlined in the Work Plan field activities were to:

1) Drill three (3) boreholes terminating in the uppermost shale unit.
2) Record and describe the lithology of each borehole.
3) Identify if any saturated conditions exist in the borehole.
4) Determine total depth of borehole upon reaching the uppermost shale unit.
5) Allow borehole to remain open for a 24-hour period.
6) Following the 24-hour period measure the presence or absence of standing water using a water level indicator.
7) If ground water is identified in any of the boreholes within 24 hours of completion, construct monitoring well for that borehole.

Field Investigation
On January 16th, 2013 three boreholes were drilled near the East Storage Pond at Highland-Smith Ranch in accordance with the Work Plan. The boreholes were completed using air-rotary drilling and allowed to remain open for 24 hours to identify if saturated conditions exist in the hydrostratigraphic unit beneath the storage ponds.

Drilling

Tyler Exploration drilled three 5⅝ -inch diameter boreholes. The boreholes were drilled through the unconsolidated materials overlying the uppermost shale unit. Drill cuttings were collected using a wire colander and described in five-foot intervals for each borehole. Field notes are included as Exhibit A to this Field Report. Lithologic logs for each borehole are included as Exhibit B to this Field Report. Geophysical logging of each borehole occurred after completion of drilling. The geophysical logs are included as Exhibit C to this Field Report.

As shown in Exhibit B, the geologic materials observed are comprised primarily of sand and with varying amounts of fine-grained sediments (silt and/or clay) and were poorly to moderately induration. A thin organic horizon was observed within the uppermost 5-foot interval of each boring. With the exception of EP-1, all of the borings were terminated in the uppermost shale unit. EP-1 was truncated in an interbedded sequence dominated by fine-grained sediments below a sand unit.

Upon reaching the uppermost shale unit, the total depth for each borehole was measured from the ground surface (Table 1). No saturated conditions were encountered during drilling; thus, boreholes were allowed to remain open for 24 hours upon reaching total depth to allow for the identification of ground water.

Drilling equipment was sprayed with mixture of Alconox detergent and deionized water as well as pressure washed between boreholes to minimize contamination between wells.

Abandonment

No monitoring wells were constructed due to the lack of saturated conditions. Boreholes were subsequently abandoned in accordance with LDQ Non-Coal Rules and Regulations

Chapter 8 and Wyoming Statutes §35-11-404 by Cameco staff. The volume of bentonite chips needed for abandonment was estimated and then the boreholes were abandoned by pouring a known volume of 3/8 inch bentonite chips into the borehole. If the estimated volume of chips could not be poured into the borehole, tools were placed into the borehole to remove the bridging chips. Abandonment forms are provided in Exhibit D.

Discussion and Conclusions

The borehole drilling was completed on January 17th, 2012 after test bores were observed for 24 hours. All of the borings were dry after the 24-hour observation period, with minor borehole collapse (< 1.5 feet). The relative lack of borehole collapse is indicative of low moisture contents and low confining stresses within the borehole; if the sediments were saturated, the borehole would have 1) water in the borehole and 2) significantly more collapsed material. Therefore, it is concluded that the uppermost sediments are unsaturated.

Table 1

Borehole	TD (Ft)	TD after 24 hr (Ft)	Footage Lost in 24 hr (Ft)	Top of shale (Ft)	Water	Comments
EP-1	53.2	52.6	0.6	35	NO	Small flakes of blue /grey clay stuck to water level indicator probe.
EP-2	79.75	78.25	1.5	48	NO	Very fine light brown to tan sand on water level indicator probe.
EP-3	51.25	50.7	0.55	45	NO	Slight dark brown to dark grey clay on water level indicator.

* all measurements are below ground surface (BGS)

EXHIBIT A

1/16/12 PC

6:30 on site

6:50 Move rig to well site EP-2
SW of storage ponds

8:00 Start drilling w/ air
5 ft loam
~20 ft hard "sticky" clay, slight moisture
~23 ft first sand
~27 ft Sandy clay

8:45 Reach 40 ft clear hole
~43 ft reach blue grey silt
~57 ft hit other colored silt/clay
~57 ft stop drilling trip out

9:15 Tag bottom 53.2 ft (bgs) let sit for 24 hours open to make water

9:25 move to & Rig up EP-1

9:35 start drilling w/ air EP-1
5 ft organics/topsoil/dump debris
-13-25 ft hard well compacted/slightly damp clay w/ fines
~22 ft reach fine sand below hard clay; V. Dry

9:57 Fine sand through 42 ft (Bgs)
~55 ft hit hard layer wait for returns

1/16/12 PC

10:20 ~55 ft return of yellowish grey clay w/ sand fines

10:25 No returns / hole stuffing
Trip pipe in and out of hole to clean it and keep it open for returns

11:15 Drill again w/ air wait for returns

11:30 No returns Trip out of hole

11:45 Trip Back in hole drill w/ air to 80 ft

11:50 Trip out of hole
Never saw any blue/grey silt
Very thin grey/tan layer of silt clay ~60-63 ft

12:00 Tag bottom 79.75 ft (bgs)

12:05 Move over and rig up for EP-3 SE of storage ponds

13:16 Start drilling w/ Air EP-3
Top 6" of well old cement pad
~10-15 ft V. soft unconsolidated sand
~19 ft Sand & clay
~22 ft hard pack damp clay

13:31 new bit trip out

13:37 ~~Torque~~ pc Drill bit slid significantly more Rig 2 ft & Re drill (Too much torque on Kelly)

(37)

1/16/12 PC EP-3

13:45 Re drill EP-3 2nd time w/ air to ~25 ft

pc

14:11 ~30-35 ft Slight hard clay layer w/ fines

~55 ft Sand, V. F Sand, & C. lay

14:56 ~60 ft hit solid clay layer w/ little to no moisture

15:03 Drill to TD of ~60 ft

15:08 Tag bottom of Hole 51.25 ft (bgs) Let hole set for 24 hr

15:15 Move off / Log hole

Gamma Logs for EP 1, 2, 3 sent to Ed Lacave

15:50 Leave Site for day

1/16

(38)

1/17/12

7:00 onsite

Run errands to F-Trailer

7:54 Check EP-2 for water

T.D. = 52.6 ft (bgs)

53.2 - 52.6 ft = .6 ft lost overnight

Hole was dry, No water, Slight clay and sand stuck to tag line.

8:05 Check EP-1 for water

measured T.D. = 78.25 ft (bgs)

79.75 ft - 78.25 ft = 1.5 ft lost overnight

Hole was dry no reading on water level indicator. Very fine Sand stuck to probe when retrived

9:33 Check EP-3 for water

measured T.D. = 50.70 ft (bgs)

51.25 ft - 50.70 ft = .55 ft lost overnight

Hole was dry, water level indicator tagged bottom. Dark brown clay stuck to tag line when retrieved

13:47 check EP-1 for water again

measured T.D. = 78.25 ft (bgs)

pc Hole dry, W.L.I Tagged bottom

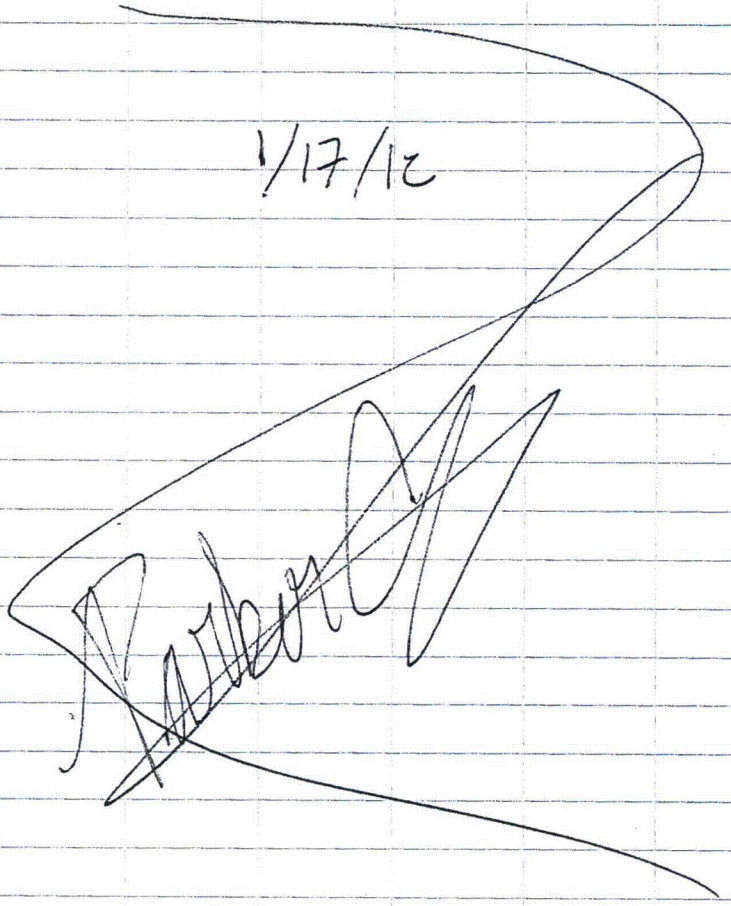
14:56 Check EP-3 2nd time for water

measured T.D. = 50.50 ft (bgs)

1/17/12

Hole was dry / W.L.I came back with no reading & tagged bottom
- slight clay on tagline probe

1315 PC leaves site for day



PC

1/4b/12

Well Site EP-2

Description

Depth	
5	Dark brown to tan sandy loam / organics
10	Tn to Dark brown fine sand with slight dark grey clay
15	Very Hard dark brown to dark grey clay with intb. sand fines
20	Dark brown hard clay slightly moist with intb. sand fines
25	V. Fine sand light brown to tan with slight clay & silt grains
30	V. Fine to fine light brown sand with dark grey clay cement
35	Dark brown to dark grey clay with fine grained lt. brown sand
@ 40	Grey to dark grey clay; moderately hard, slight sand fines
45	Dark grey to maroon shale, hard, blocky
50	Grey to light grey shale, hard, layered
55	Dark grey to blue grey shale, hard, chunky
@ 60	~~Dark grey to blue grey shale w/ ocher colored sand fines~~ pc
70	
TD pc	

1/16/12

wellsite EP-1

Depth

Description

5	Light brown to slight reddish fine sand to loamy soil
10	Dark grey to reddish grey clay w/ slight clay fines
15	Hard dark grey clay / shale, highly compacted
20	Dark grey clay w/ slight ~~clay~~ sand pc fines / shale
25	Fine to moderately coarse sand, lt. brown to Buff, slight clay
30	V. Fine to medium grain sandy lt. brown w/ dark grey clay intb
35	V. Fine to medium grain unconsolidated sand, lt. brown to tan
40	Tan to brown V. fine to ~~med~~ pc Medium grain sand w/ slight tan clay
@ 45	Tan V. Fine to medium grain sand, V. dry, unconsolidated
50	Dark brown to grey clay w/ sand fines
55	Ocher colored fine silt with intb. dark grey shale
60	lt. grey clay w/ pale to ocher colored fine silt
@ 65	Mod coarse pale to lt. tan sand, little clay
70	mod coarse silica sand, lt. tan to pale, no clay
75	Dark grey clay with fine to mod. coarse lt. tan sand.

Scale: 1 square = _____

1/16/12 PC

Wellsite EP-3

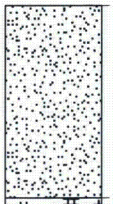
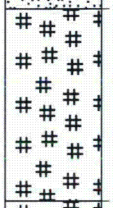
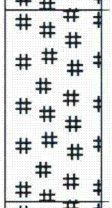
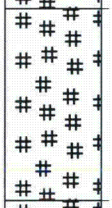
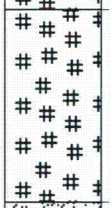
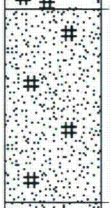
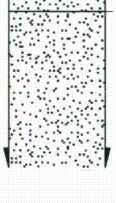
Depth	Description
5	Dark grey clay with fine to moderate grained sand intb
10	V fine to moderate coarse tan sand w/ dark grey clay
15	V.fine to coarse sand, lt. brown to tan, silicoriich, no clay
20	Dark grey clay to shale, hard, slight sand fines
25	Dark grey to maroon grey clay w/ intb. silt to sand (tan)
30	Dark grey clay with fine gram to mod coarse lt brown silica sand
35	lt. grey to grey clay with fine to mod coarse buff sand
40	Fine to Coarse lt. brown sand w/ intb. lt. grey clay
45	Dark grey clay w/ fine to coarse lt. brown sand grains (Uncon
50	Lt. brown to Lt. grey shale / clay, lt. brown silt
55	Dark grey clay to lt. grey clay, lt. brown silt

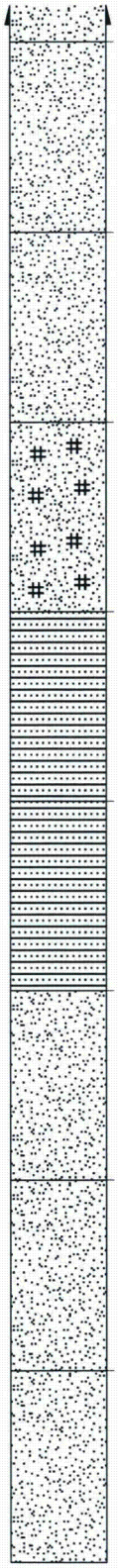
Kelly

Scale: 1 square = _____

EXHIBIT B

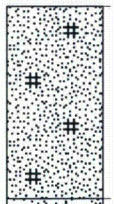
Report Date: 2/22/2013	BORING LOG	Boring No.: EP-1
Company Name: Telesto Solutions, Inc.		Surface Elevation:
Site Name: Smith Ranch-Highland Uranium Project		Total Depth: 75 ft
Location: East Storage Pond		Start: 1/16/13 at 9:35
Logged By: Parker Coit		Finish: 1/16/13 at 12:00
Contractor: Tyler Drilling		Equipment Type: Air Rotary
Conditions:		Sample Hammer Torque:
Comments:		Sampling Methods:

Graphical Log	Top Depth (ft)	Thick. (ft)	Bt.Elev. (ft)	Strata Code	Material Description	Sample No.	Sampling Method	Penetration Type	Penetration Rate	Remarks
	0	5	-5		light brown to slight reddish fine sand to loamy soil					
	5	5	-10		dark grey to reddish grey clay with slight clay fines					
	10	5	-15		hard dark grey clay/shale, highly compacted					
	15	5	-20		dark grey clay with slight sand fines/shale					
	20	5	-25		fine to moderately coarse sand, light brown to buff, slight clay					
	25	5	-30		very fine to medium grain sandy light brown with dark grey clay interbeds					
	30	5	-35		very fine to medium grain unconsolidated sand, light brown to tan					

Graphical Log	Top Depth (ft)	Thick. (ft)	Bt.Elev. (ft)	Strata Code	Material Description	Sample No.	Sampling Method	Penetration Type	Penetration Rate	Remarks
	35	5	-40		tan to brown very fine to medium grain sand with slight tan clay					
	40	5	-45		tan very fine to medium grain sand, very dry, unconsolidated					
	45	5	-50		dark brown to grey clay with sand fines					
	50	5	-55		ochre colored fine silt with interbedded dark grey shale					
	55	5	-60		light grey clay with pale to ocher colored fine silt					
	60	5	-65		medium coarse pale to light tan sand, little clay					
	65	5	-70		medium coarse silica sand light tan to pale, no clay					
	70	5	-75		dark grey clay with fine to moderately coarse light tan sand					

75 ft T.D.

Report Date: 2/22/2013	BORING LOG	Boring No.: EP-2
Company Name: Telesto Solutions, Inc.		Surface Elevation:
Site Name: Smith Ranch-Highland Uranium Project		Total Depth: 55 ft
Location: East Storage Pond		Start: 1/16/13 at 8:00
Logged By: Parker Coit		Finish: 1/16/13 at 9:25
Contractor: Tyler Drilling		Equipment Type: Air Rotary
Conditions:		Sample Hammer Torque:
Comments:		Sampling Methods:

Graphical Log	Top Depth (ft)	Thick. (ft)	Bt.Elev. (ft)	Strata Code	Material Description	Sample No.	Sampling Method	Penetration Type	Penetration Rate	Remarks
	0	5	-5		Dark brown to tan sandy loam/organics					
	5	5	-10		Tan to dark brown fine sand with slight dark grey clay					
	10	5	-15		Very Hard dark brown to dark grey clay with sand fines					
	15	5	-20		Dark brown hard clay slightly moist with sand fines					
	20	5	-25		Very fine sand light brown to tan with slight clay and silty gravel					
	25	5	-30		Very fine to fine lightbrown sandd wiith dark grey clay					
	30	5	-35		Dark brown to dark grey clay with fine grained light brown sand					

Graphical Log	Top Depth (ft)	Thick. (ft)	Bt.Elev. (ft)	Strata Code	Material Description	Sample No.	Sampling Method	Penetration		Remarks
								Type	Rate	
	35	5	-40		grey to dark grey clay; moderately hard; slight sand fines					
	40	5	-45		Dark grey to maroon shale, hard, blocky					
	45	5	-50		Grey to light grey shale, hard, layered					
	50	5	-55		Dark grey to blue grey shale, hard, chunky					

55 ft T.D.

EXHIBIT C

EP-1

3674-26-2881 01/16/13

LOG PARAMETERS

MATRIX DENSITY : 2.65

MAGNETIC DECL : 14.000

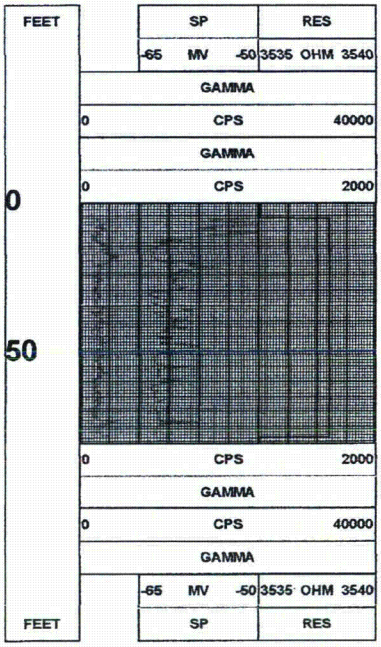
PRESENTATION NAME/DATE = p_50mini.0 06/18/2009

NEUTRON MATRIX : SANDSTONE

ELECT. CUTOFF : 99999

MATRIX DELTA T : 54

BIT SIZE : 5 5/8



EP-2

3674-26-2882 01/16/13

LOG PARAMETERS

MATRIX DENSITY : 2.65

MAGNETIC DECL : 14.000

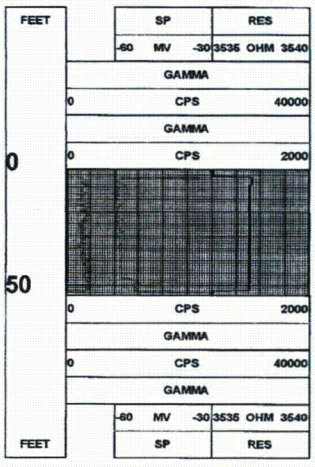
NEUTRON MATRIX : SANDSTONE

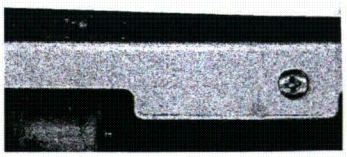
ELECT. CUTOFF : 99999

MATRIX DELTA T : 54

BIT SIZE : 5 5/8

PRESENTATION NAME/DATE = p1_50mni.0 06/18/2009





EP-3

3674-26-2883 01/16/13

LOG PARAMETERS

MATRIX DENSITY : 2.65

MAGNETIC DECL : 14.000

PRESENTATION NAME/DATE = p150mini.0 08/18/2009

NEUTRON MATRIX : SANDSTONE

ELECT. CUTOFF : 99999

MATRIX DELTA T : 54

BIT SIZE : 5 5/8

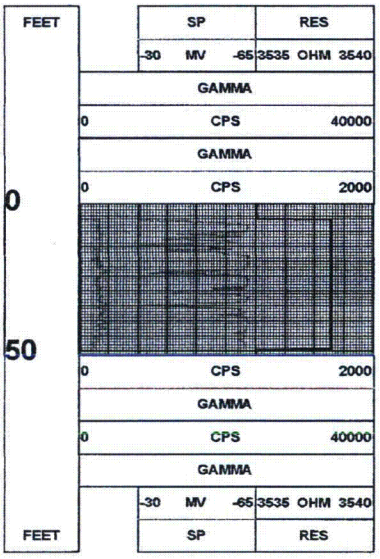


EXHIBIT D

Cameco

Cameco Resources

WYOMING OPERATIONS
UNCASED HOLE ABANDONMENT
SUBSURFACE ABANDONMENT FORM

Delineation Hole ID 3674-36-2883 EP3

Depth to Sealant Column (Ft) ÷ 5 = (16) Bags Needed

Total Depth divided by 5 equals amount of bags to be placed down hole if using Bentonite Chips

Abandonment Material Bent. Chips Bentonite Bags Used 14

Subsurface Abandonment Date 2-14-13 Cement BBL N/A

Cap Depth (Ft) 21

Hole ID Tag Installed YES ✓ NO

Printed Name Shawn Elliott

Company Name Cameco

Signature/ Date Shawn Elliott 2-14-13

Comments:

Cameco

Cameco Resources

WYOMING OPERATIONS
UNCASED HOLE ABANDONMENT
SUBSURFACE ABANDONMENT FORM

Delineation Hole ID 3674-36-2882 EP-2

Depth to Sealant Column (Ft) ÷ 5 = (10.4) Bags Needed

Total Depth divided by 5 equals amount of bags to be placed down hole if using Bentonite Chips

Abandonment Material Bent. Chips Bentonite Bags Used 11

Subsurface Abandonment Date 2-13-13 Cement BBL N/A

Cap Depth (Ft) 2 1/2'

Hole ID Tag Installed YES ✓ NO

Printed Name Shawn Elliott

Company Name Cameco

Signature/ Date Shawn Elliott 2-13-13

Comments:

Cameco

Cameco Resources

WYOMING OPERATIONS
UNCASED HOLE ABANDONMENT
SUBSURFACE ABANDONMENT FORM

Delineation Hole ID 3674-36-2881 EP-1

Depth to Sealant Column (Ft) ÷ 5 = (16.6) Bags Needed

Total Depth divided by 5 equals amount of bags to be placed down hole if using Bentonite Chips

Abandonment Material Bent. Bentonite Bags Used 19

Subsurface Abandonment Date 2-13-13 Cement BBL N/A

Cap Depth (Ft) 2'

Hole ID Tag Installed YES ✓ NO

Printed Name Shawn Elliott

Company Name Cameco

Signature/ Date Shawn Elliott 2-13-13

Comments: